



**College of Intensive Care Medicine  
of Australia and New Zealand**

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**APPLICATION FOR FREE PAPER AND/OR POSTER PRESENTATION**  
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Name of the author (must be the first author):  
Fatanah Suhaimi

Names of Co-authors:  
J. Geoffrey Chase, Aaron Le Compte and Geoffrey M. Shaw.

Title of submission:  
The influence of clinical experience in sepsis diagnosis.

## **Abstract: Max 300 words in length – use 11pt font in Times Roman**

Sepsis is a disease of the microcirculation associated with substantial mortality [1], and characterized by infection and systemic inflammatory response (SIRS). However, infection is often strongly suspected without being microbiologically confirmed [2] and blood culture results take 1-3 days. Hence, sepsis diagnosis is challenging. This study analyzed the potential of several available parameters captured in typical ICU settings as possible bio-markers for sepsis diagnosis.

A total of 7505 data points were gathered from 30 patients during a specific sepsis study from the Christchurch Hospital Intensive Care Unit (ICU). Ethics approval to collect, audit and use this data under informed consent was obtained from the Upper South Regional Ethics Committee, New Zealand. Data includes model-based insulin sensitivity, SI, and clinical parameters (temperature, heart rate, urine output, blood glucose, respiratory rate and mean arterial blood pressure). These data are tested using neural networks and statistical analysis to investigate the influence of each parameter towards predicting SS2, a scoring system used to classify sepsis state, on an hourly basis and whether any specific patterns exist between parameters or over time to predict the presence of sepsis.

On a single parameter test set, sensitivity and specificity using temperature are 93.1 and 9.9%, HR (Sensitivity=96.0, Specificity =18.6%), RR (Sensitivity=99.9, Specificity =0.3%), urine (Sensitivity=97.3, Specificity=2.4%), MABP (Sensitivity=90.8, Specificity =6.3%) and SI (Sensitivity=99.2, Specificity =1.2%). Combining all clinical parameters improves specificity to 39.4% and reduces sensitivity to 82.2%. Clinical feedback of known sepsis state achieves sensitivity and specificity of 91.8% and 84.0%, respectively.

From all the tests conducted, none exceeds current clinical practice or an experience clinician. A flexible neural network framework showed that no parameter, alone or in combination, improved current conditions and capability. These results indicate the need for more specific measures that are measurable on an hourly basis and directly detect the effects of sepsis in the microcirculation.

[1] R. A. Balk and R. C. Bone. The septic syndrome. Definition and clinical implications. Crit Care Clin, 5:1–8, Jan 1989.

[2] S. D. Carrigan, G. Scott, and M. Tabrizian. Toward resolving the challenges of sepsis diagnosis. Clin. Chem., 50:1301–1314, Aug 2004.